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ABSTRACT

A study used the Institut fur Arbeitsmarkt- und Berufsforschung (IAB) Establishment Panel as a data set for a labor demand analysis. (The IAB Establishment Panel are all German firms employing at least one employee subject to the compulsory social security scheme.) The first interviews in 1993 had a response rate of 4,356 or 71 percent; of these, 3,900 answered the questionnaire in the second wave and 3,404 in the third wave. Data analysis from the field of company employment and personnel policy identified the following variables affecting expected employment development: dismissal costs, recruiting and training costs, slower change in number of qualified employees in sophisticated jobs due to higher training costs, and time and cost required to adjust to technological changes. In an analysis of the determinants for changes in employment expected by the firms, the following were used as explanatory variables: proportion of qualified workers, proportion of part-time workers, company's profit situation, expected changes in business volume, technological status, number of organizational changes, and number of workers. The conclusion was that firms with good profits and better business prospects and small firms tended to have more positive expectations for employment. Significant differences were found between the manufacturing and service sectors. (39 references) (YLB)

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Institute for Employment Research

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The IAB Establishment Panel with an Exemplary Analysis of Employment Expectations

- Establishment Panel
- Labour Demand

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Lutz Bellmann *)

THE IAB ESTABLISHMENT PANEL

WITH AN EXEMPLARY ANALYSIS OF

EMPLOYMENT EXPECTATIONS

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0 Abstract

Compared to the abundance of theoretical and empirical research on the supply of labour there is a striking lack of such research on the demand for labour. Hamermesh (1993) pointed out that the lack of data about labour demand is one of the reasons for this. The IAB Establishment Panel is a suitable data set for a labour demand analysis that meets all relevant requirements. Therefore this paper aims at providing a survey of the population covered, the sampling method , the catalogue of questions and the studies carried out with the IAB Establishment Panel so far. As an example for an analysis the determinants for the changes in employment expected by the firms are examined. In so doing, the proportion of qualified workers, the proportion of part-time workers, the company's profit situation, expected changes in business volume, the technological status, the number of organizational changes and the number of workers (as a proxy for the size of the establishment), were used as explanatory variables in ordinal probit models. The result is that firms with good profits and better business prospects and small firms tend to have more positive expectations for employment. There are, however, significant differences between the manufacturing and the service sectors.

1 Introduction

Labour administration, labour market research and firms are equally interested in systematic information about the labour market's demand side. The lack of data about this resulted in an imbalance in our knowledge of the two sides of the labour market as Hamermesh (1993, p.400) states. During a recession firms have several response options: closing down entire plants, dismissing labour, reducing overtime, adopting short-time work, shortening working hours and increasing part-time work. Although generally deemed necessary, such studies often fail for want of viable data. A second focus of work with data sets of firms is the examination of inter-company wage structures, according to regions, industries and sectors, to permit not only the analysis of macroeconomic development, but also that of specific industries.

Below we shall first describe the population of the IAB Establishment Panel and the sampling method with the help of the establishment file of the employment statistics (Section II). Next we explain the catalogue of questions and a survey of the studies based on the IAB Establishment Panel so far (Section III). We use the IAB Establishment Panel for an exemplary analysis from the IAB's special-interest field of corporate employment and personnel policy, i.e. a study of the determinants of establishments' expected changes in employment (Section IV). The last section is a summary of the paper's content.

2 Population and Sampling

The population of the IAB Establishment Panel are all firms (up to 1995 only those in West Germany, after the 4th wave 1996 also those in the eastern Laender) employing at least one employee subject to the compulsory social security scheme. This means that, as a rule, companies without such employees, i.e. mainly 'one-man-companies' or public service offices employing exclusively civil servants are excluded. As a result of the

mandatory registration of employees by their employers with the social security institutions employment statistics are available. This data can be combined with the help of a so-called company code (as an 'account number' to which all data of the social-security paying employees can be booked), which then permits the identification of local 'operational units' on certain reference dates and the analysis of certain aspects such as industry and company size. Although this transformation of these statistics on employees into an establishment file for a specific reference date (in this case: 30 June each year) is somewhat fuzzy regarding the demarcation of the units, completeness of data and registration of employees over the course of time, especially for longitudinal studies, because self-employed, civil servants and unpaid family members are not included (for this see e.g. Fritsch/König/Weisshuhn 1994, p.68ff.; Bender/Hilzendegen 1995, p.84), it offers considerable advantages over other alternatives as a sampling base for company surveys. As the results of the first panel wave 1993 showed, the company code provides the type of unit that can be appropriately interpreted under economic aspects in over 80% of the cases. For the survey itself only the information about the population as at 30 June of the respective previous year may be used since the preparation of employment statistics data for the current year is not available at the time of the survey.

One must also mention that the IAB Establishment Panel includes all establishments and not merely those which are, for example, applying for a loan (see Birch 1981, 1987). Neither is there a minimum size of establishments (see e.g. Davis and Haltiwanger 1990). Boeri and Cramer (1991) showed that smaller companies significantly affect the dynamics of employment. In addition, the volume of our survey permits careful checks for consistency and data verification which are not possible with smaller sets of data.

The unit surveyed is the establishment, not the company, as an economic or legal unit. Official statistics define an 'establishment' as the local unit which in fact performs the activities of a company, i.e. the manufacture of products or the provision of services. Other panel studies in the Federal Republic of Germany - such as the Lower Saxony Establishment Panel and the NIFA Panel of the German mechanical engineering industry - likewise prefer the concept of 'establishment' to that of company for the purpose of surveys (see Brand/Carstensen 1995, p.2ff; Hauptmanns/Ostendorf 1994, p.3ff), even though individuals are questioned about certain labour market or corporate policy issues who are not the responsible decision-makers at the company level. For the purposes of the IAB Establishment Panel the 'establishment' normally is the adequate surveying unit, because employment or personnel policies and their determinants are expressed in certain operational dimension or personnel structures in the establishment. At the same time the operational indices required for the analysis such as turnover, working hours, wage bill etc. for the persons in question are directly available.

The first wave of surveys of the IAB Establishment Panel was made in the third quarter of 1993. The results of the interviews in 4,356 establishments by Infratest Sozialfor-

schung (Munich) interviewers are available.[1] The response rate was 71% of the establishment available which had been selected from the establishment file of Bundesanstalt für Arbeit's employment statistics according to the principle of optimum stratification of the random sample. The stratification cells were defined by ten establishment size categories and 16 industries. The establishment's selection probability increased with their size (see Table 1).

Table 1:
Number of establishments replying, probability of selection and response rates according to size of establishment

Number of workers [1]	Number of establishments surveyed [2]	Selection probability	Number of replying establishments	Response rate
1 - 4	1,072	.0011	625	.67
5 - 9	431	.0015	250	.64
10 - 19	466	.0030	299	.71
20 - 49	862	.0089	542	.70
50 - 99	535	.0153	350	.72
100 - 199	543	.0304	376	.77
200 - 499	923	.0862	615	.74
500 - 999	479	.1504	304	.71
1,000 - 4,999	1,497	.8765	924	.72
5,000+	115	.9127	71	.73
Total	6,923	.0043	4,356	.71

1) Total number of workers on 30 June 1992
2) This is the unadjusted gross sample. About 800 establishments could not be included in the survey for various reasons, e.g. because they had been wound up at the time of the survey.
Source: 1993 IAB Establishment Panel

After this initial wave of interviews, most of these same establishments were to be re-examined in 1994 and 1995. For establishments which were second and third-time repliers in waves 2 and 3 respectively the response rates were above 80% (see Infratest Sozialforschung 1995a, p.11ff; Infratest Sozialforschung 1995b, p.9ff). Of the 4,356 establishments included in the initial survey, 3,900 answered the questionnaire in the second wave and 3,404 in the third wave.

[1] For further information about the IAB Establishment Panel see Infratest Sozialforschung (1993, 1994, 1995a, 1995b), Project Group IAB Establishment Panel (1991, 1993, 1994), Bellmann/Kohaut/Kühl (1994, 1995).

In addition to this most important sub-sample for the data analysis additional establishments were interviewed in a complementary sample defined by first time or repeated registration of at least one employee subject to social security payments at the reference date of the specific panel wave. Furthermore cases which had been temporarily unavailable for one of the panel's waves (so-called rework sample) were questioned. Therefore the second wave comprises the information relating to a total of 4,138 establishments and to 4,097 establishments for the third wave.

The matrix of the population of ten establishment sizes and 16 industries defined according to employment statistics is not only used to determine the stratified gross sample, but also to weigh and extrapolate the sample. All of the data from the net sample are extrapolated with an extrapolation factor proportional to the establishment for the respective cross-section 1993 to 1995 as an inverse value of the sampling ratio. Because of the sampling procedure applied the extrapolation factors for the data of small establishments are much higher than those for large establishments. In addition therefore an extrapolation factor for longitudinal evaluations is determined which helps to offset the disproportionate loss of replies in the different panel waves and adapts it to the original structure of the population.

3 Catalogue of Questions

Table 2 provides a survey of the questionnaire which changed for the different waves of the IAB Establishment Panel. The questionnaire for repeated interviews can be shorter, because certain data do not change frequently and are therefore only obtained during the first interview and at certain intervals thereafter. Also the focus shifted during the different waves (e.g. in the second wave it was on the relationship between the establishment and the labour office).

The major results of the different waves of the IAB Establishment Panel are summarized in several papers in the IAB publication series Mitteilungen aus der Arbeitsmarkt- und Berufsforschung and a report for the German Federal Ministry for Education, Science, Research and Technology (cf. Projektgruppe Betriebspanel 1991, 1993, 1994 and 1996). Individual publications covered the topics of employment changes in the service sector by Kühl (1995), development of working and company operating hours by Düll (1995) and of overtime by Kölling (1996), the development of wages by Bellmann/Kohaut (1995a, 1995b, 1995c, 1997) and the relationship of job and labour turnover, and the technological status of equipment by Bellmann/Boeri (1995, 1996) and Bellmann/Kölling (1996). Bellmann/Blien (1996a, 1996b) used the regional information contained in the Establishment Panel to estimate a so-called wage curve. A study was prepared for OECD and the Federal Ministry for Education, Science, Research and Technology which was published as a volume in the IAB publication series Beiträge zur Arbeitsmarkt- und Berufsforschung (cf. Bellmann, Düll, Kühl, Lahner, Lehmann 1996). To keep the representatives of the establishments informed about the survey's results a brief information sheet dealing with specific topics entitled 'Employment Trends' is regularly compiled.

4 Determinants of Expected Employment Development

4.1 First Theoretical Considerations

Below we shall present an example for an analysis of the data of the IAB Establishment Panel from the field of company employment and personnel policy. The expected changes in the level of employment is of major importance for decision-makers in labour market and employment policy, for one reason, because it describes the development of incomes and expenses of public budgets. Dynamic models of labour demand examine theoretically and empirically whether companies will cut their workforce in response to certain negative shocks or whether they will reduce overtime, apply for short-time working, change their employment structure or hedge labour in anticipation of better times.

Table 2:
Number of questions relating to the different subjects surveyed in the first three waves of the IAB Establishment Panel

Subject	Wave 1	Wave 2	Wave 3
Size of workforce and anticipated changes	4	9 (+1)	9 (+1)
Economic criteria for employment, business policy and operational planning, including:	25	15 (+6)	24
- technological status of equipment			
- innovative products	2	- (+1)	2
- organisational changes	3	- (+3)	-
	-	-	1
Composition of workforce	6	6	5
Apprenticeships/Training positions	8	9	12
Number of personnel hired in the first 6 months	6	5	5
Current recruiting activities	4	4	4
Number of outgoing personnel in the first six month	2	2	2
Salaries and wages	5	1	3
Working and operating hours	9	-	5
Short time work/overtime	-	3	-
Further training	3	2	2
General data of the establishment/office	4	(+6)	(+6)
Contacts with the labour office	-	5	-
Criticism of the surveying method	-	2	-

Note: The figures in brackets refer to the additional questionnaire for the establishments included in the complimentary sample

Because of the adjustment cost involved in shedding labour the actual employment level is only partially adjusted to the optimum one. Many types of dismissal cost e.g. for social plans, severance pay and company pension payments (if no actuary discounting is

made) are associated with cutting the number of employees. When hiring more people the company has expenses for recruiting and training. The number of qualified employees working in more sophisticated jobs changes more slowly than that of less qualified workers because training costs more for the former. Technological progress might also cause a higher demand for qualified workers (cf. Bellmann/Möller 1995). This would mean that the employment expectations of companies with a larger proportion of qualified workers would be more favourable. The adaptation of the actual demand for labour to the optimum is delayed not only by companies' adjustment costs, but also by the time required to adjust to technological changes. For these reasons adaptation is only partially completed during a current period, i.e. either labour is hedged or less is hired than would be the optimum (Palm/Peeters/Pfann 1993). Schumpeter (1942) described the concept of a dynamic entrepreneur, who produces new products, uses new technologies and forms of organization to obtain monopoly profits. If technological progress requires the use of new plant and equipment corresponding investments will only be made when there is a potential to make profits, including such that will compensate for the risk entailed in such innovation.

4.2 The Variables Used

Based on the preliminary theoretical considerations above explanatory variables and their signs can be deduced for the employment development expected by the companies. The respective question about employment expectations in the third wave of the IAB Establishment Panel asks whether the number of workers will probably

- remain about the same
- tend to increase
- tend to drop

by June 1996.

For the last two options there is an additional question about the new number of employees. There is yet another option for 'it's too early to say'. Because literature generally reports a short duration of such employment adjustments the analysis considers merely the expectations for the next year and not for the next five years, for which there is a special question.

The information about employment expectations based on these three categories was preferred over that about the change in the employment level for two reasons. For one, only 100 companies could say anything about employment trends, but were unable to quantify it. Secondly, it is difficult to use growth rates to compare employment changes in companies of different sizes. For a small company the addition of one single worker might mean a growth rate of up to 100%, while such absolute changes result in much lower growth rates for large companies (cf. also König 1994).

As shown in the theoretical considerations the transaction cost for changing the number of employees is higher for qualified workers due to more expensive recruitment and training and/or because they are complimentary with the production factor of capital, which in the end means that these changes will happen much more slowly. On the other

hand, demand for qualified workers increases because of skill-biased technical change, if the qualificational wage structure is not sufficiently flexible. The IAB Establishment Panel asks about the allocation of the total workforce to the following groups on 30 June 1995:

- apprentices (only for training contracts with this firm, without candidates for civil service)
- unskilled or semiskilled workers
- skilled workers
- employees/civil servants for simple activities
- employees/civil servants for skill-requiring activities
- candidates for civil service
- working owner/s.

The proportion of qualified workers is calculated by adding those of skilled workers and employees/civil servants for skill-requiring activities.

The effect a dynamic entrepreneur according to Schumpeter can exert on the expected changes in the company's employment can be considered in two different ways. The IAB Establishment Panel asks the establishment about the profit situation in 1995. They can rate their view on a five-item scale from 'very good' to 'unsatisfactory'; for public service and non-profit organizations the question is considered as non-applicable. There is a similar question about the expected development of business volume in fiscal year 1996 as for the expected changes in employment. Again the options 'almost the same', 'tentatively growing' and 'shrinking' are available for the answers. These variables express the potential monopoly profits of pioneering companies on existing or new markets. The variables for the technological condition of the establishment's equipment and past organizational changes express the firm's innovative activities. The IAB Establishment Panel includes two questions about the technological status of the plant. The first one is: 'How do you assess the general technological status of your equipment compared to that of other companies in the industry?'. The answering form suggests a scale with five categories, '1' means that the establishment is using modern technologies and '5' means that the equipment is totally obsolete.

Next the number of organizational changes made in the last two years and prior to that is used as an explanatory variable for the expected change in the employment level. The question relates to the following changes:

- reducing the number of hierarchies
- shifting responsibility and decisions downwards
- introduction of group work/working groups with responsibility
- merging of departments/sections
- introduction of just-in-time production/supply on call
- introduction of cost centres/profit centres

4.3 Econometric Approach

Only such establishments for which information both on dependent and independent variables were available could be included in the different regression models. The questions about the technological status of the establishment and the organizational changes made are understood differently by manufacturing establishments and by those in the service sector; this is why estimates were not only made for the overall sample (excluding public corporations), but also separate estimates for each of the industries.

The expected employment change as a dependent variable can have three values, i.e. 1 if a reduction of employment is expected, 2 if it remains the same and 3 if it is expected to increase. Thus there is a relationship between a latent variable Y* and a polytomous indicator variable Y:

$$Y = \begin{cases} 1 \text{ if } & -\infty < Y^* \leq 0 \\ 2 \text{ if } & Y^* = 0 \\ 3 \text{ if } & 0 < Y^* < \infty \end{cases}$$

The expected value of Y* is to depend linearly on a vector of the explanatory variable x, i.e.

$$\mu(x) = x'\beta$$

Y* should have normal distribution, the variance being equal to one. This then results in the probit model for ordered categories with two threshold values (ordered probit model) (cf. Maddala 1983).

4.4 Regression Results

Table 3 reports the estimates of the ordered probit models for the manufacturing industry, for services and for both of them together. Empirical results largely coincide with the theoretical expectations. The variables company profit situation, anticipated changes in business volume and (log) number of workers are significant at a level of 1% for the total sample and the two sub-samples: companies with good profits, favourable business prospects and small companies have relatively positive expectations for employment. However, no strict interpretation of a coefficient of the variable actual number of workers is possible. Based on change models it would have to be considered as an adjustment coefficient. This might also reflect the trend towards smaller operational units. It likewise applies to companies with a large number of part-time workers, but only in the manufacturing industry, however. An explanation might be the better ratio of working hours and plant utilization hours that can be achieved by using part-time workers. But cause and effect might also be reversed: companies with positive employment expectations cannot meet their demand for labour with full-time employees only. The variables reflecting the technological status of the plant and the organizational changes made are not significant for the sub-samples. For the overall sample the effect of organizational changes made in the last two years and in the period before is significantly negative: a larger number of organizational changes leads to negative employment expectations.

5 Summary

The paper intended to stress the significance of better quality data for labour demand on the labour market for labour administration, labour market research and firms themselves. As explained above Hamermesh (1993, p.400) is advocating a comprehensive establishment panel data set. The IAB Establishment Panel data collected annually since

Table 3:

Estimates of the ordinal probit models for expected changes in employment in the manufacturing and service sectors in 1995

Variable	M+S	M	S
Proportion of qualified workers	0.113	0.264	-0.010
	(1.19)	(1.81)	(0.08)
Proportion of part-time workers	0.097	0.915**	-0.140
	(0.69)	(2.89)	(0.87)
Profit situation (1= very good, ... 5 = unsatisfactory)	-0.242**	-0.215**	-0.112**
	(9.70)	(6.48)	(5.50)
Business prospects (1 = volume will shrink, 2= will remain, 3= will increase)	0.579**	0.528**	0.634**
	(14.58)	(9.72)	(10.75)
Technological status (1 = very state-of-the-art, 2= state-of-the-art; 3 = obsolete)	-0.042	-0.071	-0.012
	(0.78)	(0.90)	(0.17)
Number of organisational changes in the last two years	-0.043*	-0.050	-0.025
	(2.19)	(1.95)	(0.78)
Number of organisational changes prior to the last two years	-0.059*	-0.028	-0.108*
	(2.11)	(0.79)	(2.36)
(log) of number of workers	-0.113**	-0.105**	-0.112**
	(7.59)	(4.45)	(5.50)
Manufacturing sector (yes =1, other = 0)	-0.082		
	(1.44)		
Threshold values	-0.680, 1.109	-0.517,1.153	-0.867, 1.068
Log - likelihood statistics	497.58**	223.06**	223.31**
McFadden's pseudo R^2	0.115	0.101	0.110
Number of cases	2 185	1 117	1 068

Notes: The expectations for the employment situation in the next year are scaled as follows: 1 = employ-

ment is expected to drop, 2 = no change is anticipated, 3= employment is expected to increase. S = service sector and M = manufacturing sector. Absolute t-values in brackets. The log-likelihood statistics compare the value of the restained likelihood function ,in which all parameters except for the two threshold values are set to zero, with the maximum value of the likelihood function. McFadden's R^2 is a transformation of these statistics standardised for an intervall of [0,1], see Ronning (1991, p. 63 f). *(**) means significance at the level of 5% (1%)

Source: IAB Establishment Panel (3rd wave)

1993 in the western part of the FRG and in 1996 for the first time also in the eastern part, satisfy three major conditions for this, because

- the catalogue of questions is comprehensive and thus avoids links to other operational and company data sets which pose problems for reasons of data privacy,
- sampling and extrapolation can be done with the employment statistics of the Bundesanstalt für Arbeit,
- the response rates are high, although there are considerable losses for certain questions.

One example for the analysis of the IAB Establishment Panel's data was presented from the IAB's special interest field of corporate employment and personnel policy. Determinants for the expected changes in employment by 30 June 1996 were investigated with the third wave's data. In doing so the proportion of qualified workers, the proportion of part-time workers, the company's profit situation, anticipated changes in the business volume, the technological status, the number of organizational changes and the number of workers as a proxy for the size of the company were used as explanatory variables in ordinal probit models. The result is that firms with good profits with better business prospects and small firms tend to have more positive expectations for employment. There are, however, significant differences between the manufacturing and the service sector.

When evaluating the results one must consider that in addition to the changes in the size of existing companies analysed here, macroeconomic changes might be caused by the births and deaths of establishments. But also for the analysis of the latter the establishment level is more suitable than the aggregate level: 'Of course, in the best of all possible worlds it would be interesting to work with firm data since there is always a feeling that aggregation over many different firms tends to mask the underlying structure, perhaps ironing out the more jagged individual firm responses. For example, individual firms sometimes open or close whole plants leading to rapid shifts in employment. We should be able to explain such activities but, at the aggregate level, they will never show up' (Nickell 1986, p. 520).

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